

Serial No. 09/899,067
Amdt. dated August 25, 2004
Reply to Office Action of February 25, 2004

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Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A code combining soft handoff (CCSH) method, comprising:
measuring a strength of respective pilot signals ~~received from~~ of a plurality of base stations;
if the strength of the ~~respective~~ received pilot signal is higher than a prescribed value, ~~allocating~~ using a first code pattern ~~to the~~ of a corresponding base station to ~~receive~~ decode a coded signal from the corresponding base station, and if the strength of the received pilot signal is lower than the prescribed value, dropping a signal of the corresponding base station;
receiving the coded signals ~~using the first code pattern~~ from a first one of the plurality of remaining base stations; and
changing the ~~a~~ first code pattern ~~of for~~ a signal ~~from a second one of the plurality~~ base stations used by one of the remaining base stations to a second code pattern different from the first code pattern if the code patterns ~~of for~~ signals ~~from the first and second~~ used by the remaining base stations are the ~~first code pattern~~ same ~~when the signals from the two base stations are received,~~
wherein the change of the code pattern from the first to the second code pattern

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is performed at a prescribed time to match a code pattern changing time between at least one of the remaining base stations and a mobile terminal.

the code pattern changing time is defined in a time field of a universal handoff direction message (UHDM) sent from at least one of the remaining base stations to the mobile terminal.

Claim 2 (Canceled).

Claim 3 (Canceled).

4. (Currently Amended) The method of claim 3 1, wherein the time field comprises 6 bits to define 64 code pattern changing times, and the code pattern changing time defined in the time field is defined in a system time unit.

5. (Original) The method of claim 4, wherein the system unit time is 80ms, and wherein the time field is a SWAP_ACTION_TIME field.

6. (Original) The method of claim 5, wherein the UHDM further comprises a swap indicator field, to indicate if the code change is necessary.

7. (Currently Amended) The method of claim 2 1, wherein a determination of whether to apply the code pattern changing time is defined in a UHDM sent from the corresponding base

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station to the mobile terminal.

8. (Currently Amended) The method of claim 7, wherein a determination of whether to apply the code pattern changing time is defined in a USE_SWAP_TIME field ~~added to~~ of the UHDM.

Claim 9 (Canceled).

10. (Currently Amended) A handoff method for a communication system, comprising:
measuring a strength of pilot signals received from a plurality of base stations;
if the strength of the received pilot signal is higher than a prescribed value,
allocating a new code pattern to a corresponding base station to receive a signal from the base
station, and if the strength of the received pilot signal is lower than the prescribed value,
dropping a signal of the corresponding base station; and
if signals are received from three base stations, allocating different code patterns
to the signals from two of the three base stations whose pilot signal strengths are highest among
the signals from the three base stations, and receiving the signals from the two active-state base
stations,

~~The method of claim 9,~~ further comprising maintaining the code pattern allocated to a first base station and allocating a code pattern different from the code pattern of the first base station to a second base station newly determined as in the active state to receive the signal having a different code from the second base station when the mobile terminal moves to a 3-way

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handoff region and receives signals from the two active-state base stations whose pilot signal strength is high.

11. (Currently Amended) A handoff method for a communication system, comprising:
measuring a strength of pilot signals received from a plurality of base stations;
if the strength of the received pilot signal is higher than a prescribed value,
allocating a new code pattern to a corresponding base station to receive a signal from the base
station, and if the strength of the received pilot signal is lower than the prescribed value,
dropping a signal of the corresponding base station; and
if signals are received from three base stations, allocating different code patterns
to the signals from two of the three base stations whose pilot signal strengths are highest among
the signals from the three base stations, and receiving the signals from the two active-state base
stations,

~~The method of claim 10,~~ wherein if the second base station is not in the active state in the 3-way handoff region, the a base station controller allocates the different code patterns to the two base stations newly determined as in the active state to receive the signals from the two active-state base stations.

12. (Currently Amended) A handoff method for a communication system, comprising:
measuring a strength of pilot signals received from a plurality of base stations;
if the strength of the received pilot signal is higher than a prescribed value, allocating a

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new code pattern to a corresponding base station to receive a signal from the base station, and if the strength of the received pilot signal is lower than the prescribed value, dropping a signal of the corresponding base station; and

if signals are received from three base stations, allocating different code patterns to the signals from two of the three base stations whose pilot signal strengths are highest among the signals from the three base stations, and receiving the signals from the two active-state base stations.

~~The method of claim 9,~~ wherein if a mobile terminal moves from a 2-way handoff region where the mobile terminal receives the signals from first and second base stations to the 3-way handoff region where the mobile station receives signals from first, second, and third base stations, and receives the signals from the two base stations whose pilot signal strengths are high, the mobile terminal maintains the code pattern allocated to the first base station and a base station controller allocates a code pattern different from the code pattern of the first base station to the base station whose pilot signal strength is high to receive the signals from the two active-state base stations with different codes.

13. (Currently Amended) A handoff method for a communication system, comprising:
measuring a strength of pilot signals received from a plurality of base stations;
if the strength of the received pilot signal is higher than a prescribed value, allocating a new code pattern to a corresponding base station to receive a signal from the base station, and if the strength of the received pilot signal is lower than the prescribed value, dropping a signal of

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the corresponding base station; and

if signals are received from three base stations, allocating different code patterns to the signals from two of the three base stations whose pilot signal strengths are highest among the signals from the three base stations, and receiving the signals from the two active-state base stations.

~~The method of claim 9, wherein if the mobile terminal, while receiving the signals from the two active-stated base stations whose pilot signal strength is high in the 3-way handoff region, moves to a 2-way handoff region, and receives signals from the base stations corresponding to the 2-way handoff region, the mobile terminal maintains the code pattern allocated to the base station which is determined to be in the active state and from which the mobile terminal receives the signal, and a base station controller allocates a code pattern different from the code pattern of the base station from which the mobile terminal receives the signal to the base station newly determined as in the active state to receive the signals from the two active-state base stations.~~

14. (Currently Amended) A handoff method for a communication system, comprising:
measuring a strength of pilot signals received from a plurality of base stations;
if the strength of the received pilot signal is higher than a prescribed value, allocating a new code pattern to a corresponding base station to receive a signal from the base station, and if the strength of the received pilot signal is lower than the prescribed value, dropping a signal of the corresponding base station; and

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if signals are received from three base stations, allocating different code patterns to the signals from two of the three base stations whose pilot signal strengths are highest among the signals from the three base stations, and receiving the signals from the two active-state base stations.

~~The method of claim 9,~~ wherein if the pilot signal strength of the subject base station from which the mobile terminal does not receive the signal becomes higher than the pilot signal strength of the active-state base station in a state that the mobile terminal receives the signals from the two active-state base stations whose pilot signal strength is high in the 3-way handoff region, the mobile terminal determines the subject base station as the new active-state base station to receive the signal therefrom, drops the signal from the base station having the pilot signal whose strength is lower than the pilot signal strength of the subject base station, and a base station controller allocates the different code patterns to the two active-state base stations by allocating the code pattern allocated to the dropped base station to the subject base station to receive the signals from the two active-state base stations.

Claims 15-34 (Canceled)

35. (Currently Amended) A Universal Handoff Direction Message for a code combining soft handoff, comprising:

~~an action time~~ a field for indicating ~~an action time~~ that a mobile station and a base station are to change from a first puncturing pattern into to a second puncturing pattern for an

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encoder,

wherein the field comprises a first predetermined number of bits to define a second predetermined number of puncturing code pattern changing times, and wherein a puncturing code pattern changing time defined in the field is defined in a system time unit,

the first predetermined number is 6 and the second predetermined number is 64.

Claim 36 (Canceled)

Claim 37 (Canceled)

38. (Previously Presented) The Message of claim 35, wherein the second puncturing code pattern is complementary to the first puncturing code pattern.

39. (Previously Presented) The Message of claim 35, wherein at least one of the first puncturing code pattern and the second puncturing code pattern determines a type of encoder.

40. (Previously Presented) A method for transmitting a Universal Handoff Direction Message as recited in claim 35, said method including:

transmitting said Message from a base station to a mobile station when the base station is going to swap the first puncturing pattern for the second puncturing pattern.

Claims 41-47 (Canceled)

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48. (New) A universal handoff direction message sent from at least one of a plurality of base stations to a mobile station, comprising:

(a) a field for providing a prescribed time for swapping a first prescribed turbo encoder type to a second prescribed turbo encoder type; and

(b) a first indicator for indicating that the prescribed time of the field is to be used for swapping from the first turbo encoder type to the second turbo encoder type,

(c) wherein each base station uses one of the first and second prescribed turbo encoder types, and the universal handoff direction message is sent during a code combining soft handoff.

49. (New) The universal handoff direction message of claim 48, wherein the prescribed time is defined in units of a system time.

50. (New) The universal handoff direction message of claim 49, wherein the system time is 80ms.

51. (New) The universal handoff direction message of claim 49 or 50, wherein the field comprises 6 bits for defining 64 different system times.

52. (New) The universal handoff direction message of claim 48, 49, or 50, wherein the field

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corresponds to a CESH_ENC_ACTION_TIME field and the indicator corresponds to a USE_CESH_ENC_TIME indicator in the universal handoff direction message, and the indicator is "0" if the field is not used or the indicator is "1" if the field is used.

53. (New) A code combining soft hand off method comprising:

(a) receiving signals from first, second and third base stations within a handoff region, at least one of the first, second or third base stations using a turbo encoder type which is different from the other base stations;

(b) sending a pilot strength measurement message when a strength of a pilot signal of a second base station is below a prescribed value;

(c) receiving a universal handoff direction message;

(d) using the first and third base stations as active base stations; and

(e) sending a message indicating a completion of a handoff,

(f) wherein when the turbo encoder types of the first and third base stations are the same, changing the turbo encoder type of one of the first and third base stations to be different based upon information of the universal handoff direction message.

54. (New) The code combining method of claim 53, wherein the universal handoff direction message includes:

(a) a field for providing a prescribed time for swapping to the different turbo encoder type; and

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(b) an indicator for indicating that the prescribed time of the field is to be used for swapping to the different turbo encoder type, wherein

the prescribed time allows simultaneous swapping to the different turbo encoder type between the mobile station and one of the first and third base stations.

55. (New) The code combining soft handoff method of claim 53 or 54, wherein the different turbo encoder type is a complementary turbo encoder type.

56. (New) The code combining soft handoff method of claim 53, wherein the pilot strength measurement message is an extended pilot strength measurement message.

57. (New) The code combining soft handoff method of claim 53 or 56, wherein the message is an extended handoff completion message.

58. (New) The code combining soft handoff method of claim 55, wherein the complementary turbo encoder type provides a code using a puncturing pattern different from a default turbo encoder type.

59. (New) The code combining soft handoff method of 58, wherein a PUNCTURE_PATTERN field or a CCSH_TYPE field provide the information regarding the different puncture code patterns.

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60. (New) The code combining soft handoff method of claim 54, wherein the prescribed time is defined in units of a system time.

61. (New) The code combining soft handoff method of method of claim 60, wherein the system time is 80ms.

62. (New) The code combining soft handoff method of claim 60 or 61, wherein the field comprises 6 bits for defining 64 different system times.

63. (New) The code combining soft handoff method of claim 54, 60 or 61, wherein the field corresponds to a CESH_ENC_ACTION_TIME field and the indicator corresponds to a USE_CESH_ENC_TIME indicator in the universal handoff direction message, and the indicator is "0" if the field is not used or the indicator is "1" if the field is used.

64. (New) The code combining soft handoff method of claim 59, wherein the PUNCTURE_PATTERN field or the CESH_TYPE field is provided in an extended supplemental channel assignment message.

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65. (New) A method of performing code combining soft handoff (CCSH) in a communication system in which at least two base stations using a same puncturing pattern type communicate with a mobile terminal in a handoff region, comprising:

transmitting a message from at least one of the base stations to a mobile terminal when a puncturing pattern type of one of the base stations needs to be changed to a different puncturing pattern type; and

changing the current puncturing pattern type to the different puncturing pattern type according to information of the message.

66. (New) The method of claim 65, wherein the message is a universal handoff direction message.

67. (New) The method of claim 65, wherein the message comprises a changing time field to inform a time to change to the different puncturing pattern.

68. (New) The method of claim 67, wherein the time is based on a changing action time of a turbo encoder.

69. (New) The method of claim 67, wherein the time is set in the unit of a system time of 80 ms.

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70. (New) The method of claim 66, wherein the universal handoff direction message further comprises a puncturing pattern type indicator for indicating a puncturing pattern type.

71. (New) The method of claim 65 or 66, wherein the universal handoff direction message includes:

(a) a field for providing a prescribed time for swapping to the different puncturing pattern type; and

(b) an indicator for indicating that the prescribed time of the field is to be used for swapping to the different puncturing pattern type, wherein

the prescribed time allows simultaneous swapping to the different puncturing pattern type between the mobile station and at least one of the base stations.

72. (New) The method of claim 71, wherein the field corresponds to a CESH_ENC_ACTION_TIME field and the indicator corresponds to a USE_CESH_ENC_TIME indicator in the universal handoff direction message, and the indicator is "0" if the field is not used or the indicator is "1" if the field is used.

73. (New) A subscriber unit of a mobile communication system, comprising:

means for communicating with a first base station and a second base station using a puncturing pattern type during soft handoff;

means for receiving a universal handoff direction message (UHDM) including

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information for another puncturing pattern type which will be used by one of the first and the second base stations;

means for transmitting a handoff complete message to the base stations; and

means for synchronizing a change of the puncturing pattern type which will be used by one of the first and the second base stations to another puncturing pattern type at a prescribed time based on the information of the universal direction handoff message.

74. (New) The subscribing unit of claim 73, wherein the information includes the prescribed time, and the prescribed time is based on a changing action time of a turbo encoder.

75. (New) A code combining soft handoff method, comprising:

(a) receiving signals from a first base station, the first base station having a first encoder output;

(b) sending a pilot strength measurement message when a strength of a pilot signal of a second base station exceeds a prescribed value, wherein the second base station has a second encoder output;

(c) receiving a universal handoff direction message; and

(d) sending a handoff completion message,

(e) wherein when the first and second encoder outputs of the first and second base stations, respectively, are the same, changing the output of the first base station to be different from the output of the second base station based upon information of the universal handoff

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direction message.

76. (New) The code combining soft handoff method of claim 75, wherein the universal handoff direction message includes:

- (a) a field for providing a prescribed time for swapping to the different output; and
- (b) an indicator for indicating that the prescribed time of the field is to be used for swapping to the different output, wherein

the prescribed time allows simultaneous swapping to the different output between the mobile station and one of the first and second base stations.

77. (New) The code combining soft handoff method of claim 75, wherein the pilot strength measurement message is an extended pilot strength measurement message.

78. (New) The code combining soft handoff method of claim 77, wherein the handoff completion message is an extended handoff completion message.

79. (New) The code combining soft handoff method of claim 76, wherein the prescribed time is defined in units of a system time.

80. (New) The code combining soft handoff method of method of claim 79, wherein the system time is 80ms.

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81. (New) The code combining soft handoff method of claim 79, wherein the field comprises 6 bits for defining 64 different system times.

82. (New) The code combining soft handoff method of claim 76, wherein the field corresponds to a `CCSH_ENC_ACTION_TIME` field and the indicator corresponds to a `USE_CCSH_ENC_TIME` indicator in the universal handoff direction message, and the indicator is "0" if the field is not used or the indicator is "1" if the field is used.

83. (New) The code combining soft handoff method of claim 78, wherein the `PUNCTURE_PATTERN` field or the `CCSH_TYPE` field is provided in the extended supplemental channel assignment message.